

REMARKS/ARGUMENTS

Favorable reconsideration of this application, as presently amended, and in light of the following discussion is respectfully requested.

Claims 1-15 are currently pending in the application; and Claims 1, 7, 14 and 15 are amended by the present amendment. Claim 7 is amended to correct a minor informality, and support for amended Claims 1, 14 and 15 can be found in the original specification, claims and drawings.¹ Thus, no new matter is presented.

By way of summary, the Official Action presents the following issues: the title of the invention has been objected to as not being descriptive; Claim 7 was objected to for failing to have sufficient antecedent basis; Claims 1, 14 and 15 were rejected under 35 U.S.C. § 102(b) as anticipated by Fukuoka et al. (U.S. Patent No. 6,212,331, hereinafter "Fukuoka"); Claim 2 was rejected under 35 U.S.C. § 103(a) as unpatentable over Fukuoka in view of Murakoshi (U.S. Patent No. 4,455,475, hereinafter "Murakoshi"); Claim 3 was rejected under 35 U.S.C. § 103(a) as unpatentable over Fukuoka in view of Kerr (U.S. Patent No. 5,844,600, hereinafter "Kerr"); Claims 4 and 7/4 were rejected under 35 U.S.C. § 103(a) as unpatentable over Fukuoka in view of Andrew (U.S. Patent No. 6,351,568, hereinafter "Andrew"); Claims 8-12 were rejected under 35 U.S.C. § 103(a) as unpatentable over Fukuoka in view of Thompson (U.S. Patent No. 4,661,862, hereinafter "Thompson"); Claim 13 was rejected under 35 U.S.C. § 103(a) as unpatentable over Fukuoka in view of Thompson and in further view of Spitzer et al. (U.S. Patent Pub. 2001/0012067, hereinafter "Spitzer"); and Claims 5-6, 7/5 and 7/6 were objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims.

¹ Specification at page 8, line 17 – page 9, line 5, and Fig. 3.

Applicant appreciatively acknowledges the indication of allowable subject matter. However, since Applicant considers that amended independent Claim 1 patentably defines over the applied references, the remaining dependent claims are presently maintained in dependent form.

In response to the objection to the title, the title has been amended to recite “DIGITAL IMAGE PROCESSING AND DATA COMPRESSION CIRCUIT”. This new Title replaces the original Title “IMAGE PROCESSING CIRCUIT”, and is believed to be more descriptive of the claimed subject matter.

Accordingly, Applicant respectfully requests that the objection to the title be withdrawn.

Claim 7 was objected to in the outstanding Official Action for failing to have sufficient antecedent basis. Specifically, the Official Action cites the phrase “said digital image data” as failing to have sufficient antecedent basis in the preceding claims. In response, Claim 7 is amended to read “said raw image data” so as to draw antecedent basis from this limitation as recited in the claims from which Claim 7 depends.

Accordingly, Applicant respectfully requests that the objection to Claim 7 for failing to have proper antecedent basis be withdrawn.

The outstanding Official Action asserts that Fukuoka teaches all the elements of the claimed invention. Applicant respectfully submits that amended Claim 1 states novel features clearly not taught or rendered obvious by the applied references.

Briefly recapitulating, amended Claim 1 relates to an image processing circuit which processes raw image data picked up with an image pickup device. The image processing circuit includes a means for analog-to-digital (A/D) converting the raw image data. In order to clarify the meaning of “raw” data, Claim 1 is amended to specify that the “raw” image data is image data to which no pixel interpolation has been performed. As this meaning of “raw”

was clearly set forth in the last response and the U.S. Patent and Trademark Office clearly understood that it was Applicants' position that Fukuoka did not teach his "raw" image data, it is believed that the present amendment should be entered as it raises no new issues.

The image processing circuit also includes means for compressing the raw image data converted and transferred from the A/D converting means and a means for temporarily storing the compressed data transferred from the compression means. A means for reading the compressed data then reads the compressed data from the means for temporarily storing the compressed data and expands the compressed data. This expanded data is then processed by a means for executing image processing on the expanded data which has been transferred from the expansion means.

As described in the specification, Applicant's invention improves upon conventional digital processing circuits by reducing the amount of memory required to process "raw" image data obtained directly from a CCD or CMOS sensor which is A/D converted to a digital image signal.² It should be noted that the image data is only A/D converted before the image data is compressed, stored and then expanded for image processing. Therefore, the "raw" image data, as discussed in amended Claim 1, is image data which has undergone no pixel interpolation. By performing the image processing in this manner, buffer memory size is reduced because the "raw" image data is compressed before being stored in the buffer memory. Thus, the structure, recited in amended Claim 1, leads to an improved design for an image processing circuit requiring less memory than other prior art devices resulting in a reduction in the size of an image processing device.

Amended Claim 1 recites, *inter alia*, an image processing circuit processing raw image data picked up with an image pickup device, comprising:

² Specification at pages 1-2.

“means for A/D converting said raw image data,
wherein said *raw image data is image data to which no pixel
interpolation has been performed*;
means for compressing the raw image data converted by
and transferred from said A/D converting means;
means for temporarily storing compressed data
transferred from said compression means...”

Turning to the applied reference, Fukuoka describes a digital still camera including a CCD (102) as an image pickup means. Fukuoka describes the received digital image is converted to digital image data by an A/D converter (105), before being processed by a digital signal processing circuit (106) which performs gamma correction and aperture correction on the digital image data.³ The processed image data is then transmitted through an image data compression-extension circuit (107) where the image processed data is compressed.⁴ The processed image data is then output from the compression-extension circuit (107) and is transmitted to a first-in-first-out (FIFO) circuit (108) and transmitted to a memory card interface (109).⁵

Amended Claim 1 recites that a compression means compresses the “raw” image data converted by and transferred by the A/D converting means, and that the *raw image data is image data to which no pixel interpolation has been performed*. In contrast, Fukuoka describes that the “raw” image data received from the CCD is processed by a digital signal processing circuit (106) which performs gamma correction and aperture correction on the A/D converted image data, all is noted above. Thus, in Fukuoka the image data that is compressed is not A/D converted “raw” image data to which no pixel interpolation has been performed, as recited in amended Claim 1. Instead, the image data that is compressed in Fukuoka is data has been A/D converted and image processed at least by error correction algorithms in the digital processing circuit (106) before being stored in memory. Therefore,

³ Fukuoka at col. 16, lines 47-55.

⁴ Fukuoka at col. 16, lines 55-60.

⁵ Fukuoka at col. 16, lines 60-65.

the image data in Fukuoka is image processed and is no longer “raw” image data when it is compressed and stored in memory.

Thus, in Fukuoka fails to teach or suggestion means for compressing the raw image data converted by and transferred from an A/D converting means wherein *the raw image data is image data to which no pixel interpolation has been performed*, as recited in amended Claim 1.

Furthermore, amended Claim 1 recites that after the “raw” image data is compressed, it is stored in a buffer memory and transmitted to an expansion means to that the “raw” image data is expanded before image processing takes place. In contrast, Fukuoka describes that the image data is not expanded by the data compression-extension circuit (107) until the data is regenerated and retrieved from the memory card device. Therefore, the data has already been processed and conditioned by the digital signal processing circuit (106) for expansion and viewing, and the image data is no longer “raw” compressed A/D converted image data to which no pixel interpolation has been performed, as recited in amended Claim 1.

Accordingly, Applicant respectfully requests the rejection of Claim 1 under 35 U.S.C. § 102(b) be withdrawn. For substantially the same reasons as given with respect to amended Claim 1, it is also submitted that amended Claims 14 and 15 patentably define over Fukuoka.

As discussed above, Fukuoka, does not teach or suggest compressing converted “raw” image data, storing the converted and compressed “raw” image data in the buffer memory, and then expanding the stored, compressed and converted “raw” image data before processing the “raw” image data when the “raw” image data is *image data to which no pixel interpolation is performed*. Likewise, neither Kerr, Murakoshi, Andrew, Spitzer nor Thompson remedy this deficiency. Therefore, none of the cited references, either considered alone or in combination teach or suggest the subject matter of Applicant’s Claims 2-13 which

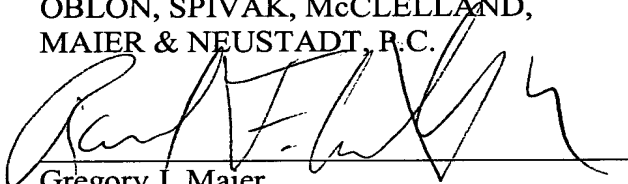
include the above distinguished limitations by virtue of dependency. Therefore, the Official Action does not provide a *prima facie* case of obviousness with regard to any of these claims.

Accordingly, Applicant respectfully requests the rejection of Claims 2-13 under 35 U.S.C. § 103 be withdrawn.

Consequently, in view of the present amendment and in light of the foregoing comments, it is respectfully submitted that the invention defined by Claims 1-15 is definite and patentably distinguishing over the applied references. The present application is therefore believed to be in condition for allowance and an early and favorable reconsideration of the application is therefore requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Gregory J. Maier
Attorney of Record
Registration No. 25,599

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)
ATH:smi

Raymond F. Cardillo, Jr.
Registration No. 40,440